

CE 6306: Infrastructure Engineering

CRN: 19569

Fall 2022

Professor Kelvin Cheu

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(915) 747-5717

Class Hours: MW 4:30am-6pm, CRBL304 or E217

Office Hours: MW 3:00pm-4:30pm, A208

Course Information: What this class is about and what we will do

COURSE DESCRIPTION

CE6360 is a required 3-credit core course for all PhD in Civil Engineering students. This course is also an elective for graduate students. CE6303 will introduce to students the concepts and techniques of analyzing infrastructure systems from the systems and network perspectives. We will examine infrastructure systems as networks of nodes and links, and study the issues concerning their planning, design and operations.

Students enrolled in CE6306 should have taken a calculus and probability course at the undergraduate level.

COURSE OBJECTIVES OR EXPECTED LEARNING OUTCOMES

The objective of this course is to introduce to students the following topics:

- Introduction to infrastructure systems
 - Characteristics of civil infrastructures; the roles of civil engineers; infrastructure report card; new concepts; network representations.
- Analysis of infrastructure service and capacity at facilities:
 - Queues in infrastructure facilities; queuing theory; Markov chain; M/M/1, M/M/m, M/M/1(k), M/M/m(k) models; level of service.
- Delivery of infrastructure services across networks:
 - Transportation models; transshipment models; minimum spanning tree; shortest path algorithm; maximum flow algorithm.
- Location of infrastructure facilities:
 - Linear programming formulations; covering problem; median problem; fixed charge facility location problem.
- Decision analysis applied to infrastructure problems:
 - Decision tree; Bayesian approach; value of experiment/information.

At the end of this course, students will have a broader view of civil infrastructure systems, how one's research relates to and contributes to the civil infrastructure systems and knowledge of several mathematical methodologies that can be applied to finding engineering solutions.

LEARNING MODULES

- Lectures: in-person, see class time in page 1. Attendance will be taken.
- Homework: Homework will be given once every 2-3 weeks. See Homework Policy below.
- Exams: There will be 3 exams. See Exam Policy below.
- Presentation: each student will make a 10-minute presentation of his/her research topic and how it relates to the materials in this course. The presentations will be towards the end of the semester.

REQUIRED MATERIALS

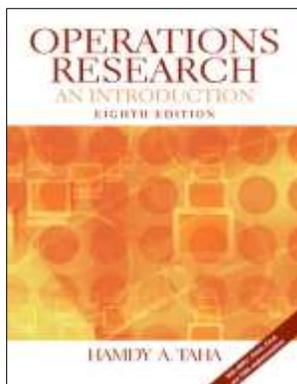
A NCEES approved calculator for use in FE Exam (refer to <https://ncees.org/exams/calculator/>).

- **Casio:** All fx-115 and fx-991 models (Any Casio calculator must have “fx-115” or “fx-991” in its model name.)
- **Hewlett Packard:** The HP 33s and HP 35s models, but no others
- **Texas Instruments:** All TI-30X and TI-36X models (Any Texas Instruments calculator must have “TI-30X” or “TI-36X” in its model name.)

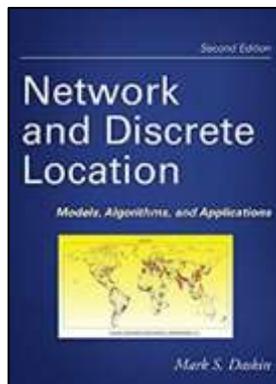
Examples of approved calculators:



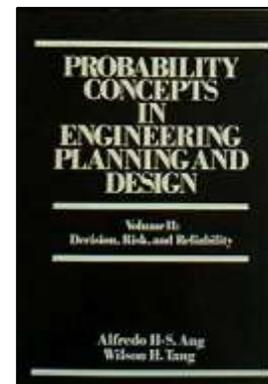
Reference book (not mandatory)



Any edition.
Covers chapters 2, 5, 6, 15, 17.



Any edition.
Covers chapters 1 to 7.



1984 edition. Vol. 2.
Covers chapters 2.

COURSE ASSIGNMENTS AND GRADING

Letter grades will be assigned based on the final course marks (out of 100):

| | |
|---|--------------|
| A | 90 and above |
| B | 80 to 89.99 |
| C | 70 to 79.99 |
| D | 60 to 69.99 |
| F | below 60 |

Contributions towards final mark (out of 100%)

| | |
|-----|------------------------------------|
| 15% | Attendance |
| 20% | Homework |
| 15% | Exam 1 |
| 15% | Exam 2 |
| 20% | Exam 3 |
| 15% | Presentation |
| 1% | Extra credit for course evaluation |

TECHNOLOGY REQUIREMENTS

Lectures (voice over PowerPoint), homework, examinations, announcements, grades will be available in Blackboard. Office hours (consultations) and discussions will be in Microsoft Teams.

You will need to have access to a computer/laptop, **scanner** (to submit homework and exams), a webcam, and a microphone.

IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP [Help Desk](#) as they are trained specifically in assisting with technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

Course Communication: How we will stay in contact with each other

- **Office Hours:** see page 1.
- **Email:** UTEP e-mail is the best way to contact me. When e-mailing me, be sure to email from your UTEP student account and please put the course number in the subject line. In the body of your e-mail, start with a polite salutation, then clearly state your question. At the end of your e-mail, be sure to put your first and last name, and your university identification number. See example:

| | | |
|---|----|--|
|  Send | To | Cheu, Ruey Long (Kelvin) |
| | Cc | |
| Subject | | CE6306: Exam 1 |
| <p>Dr Cheu I have a Premier League match on Friday against Liverpool. Can I take Exam 1 before Friday? Pep Guardiola 800123456</p> | | |

- **Discussions:** Discussion will be in class. There will be plenty of time and opportunity for interactions.
- **Announcements:** Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

NETIQUETTE

As we know, sometimes communication online can be challenging. It's possible to miscommunicate what we mean or to misunderstand what our classmates mean given the lack of body language and immediate feedback. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.

- Always consider audience. This is a college-level course; therefore, all communication should reflect polite consideration of other's ideas.
- Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Course Policies: What do you need to do to be successful in the course

HOMEWORK POLICY

- Each homework has 5 to 10 questions, from the lecture topics covered in the most recent 2-3 weeks, requires written solutions to be scanned into a PDF file and upload to Blackboard.
- Homework questions will be released 1 week before the due date.
- Homework solutions are due in class.
- Because I have given you plenty of time to complete the homework, no late submission will be accepted, unless you have an emergency or special situation.
- Graded homework will be returned to you. Solutions will be discussed in class.

EXAMINATION POLICY

- Exams will be given during class time.
- Exam dates will be determined based on the progress of the class.
- Each exam has 2 parts:
 - Part A: 10 true/false questions.
 - Part B: 2 to 4 questions.
- All exams are open book,
- Rescheduling of exams is possible if you inform me ASAP before the exam, with a valid reason. Examples of valid reasons are official UTEP travel, accident, medical, family emergency, jury duty, court appearance, military service. These are not expected and cannot be rescheduled. You may need to show documentary evidence (e.g., doctor's letter, police report, court letter). Events that can be pre-scheduled or rescheduled are not valid reasons. Examples of non-valid reasons are vacation, wedding, driving test, sending car for service, etc. Job interview and medical visits will be considered on a case by case basis. Time conflicts related to research related activities (e.g., field work) must have the request from your supervisor. If an emergency happens during the exam day, you should contact the me at the earliest possible time.
- A student who fails to show up for the make-up exam with an invalid reason will be given 0 mark for that exam; or for a valid reason an incomplete "I" grade. He/she must take the exam the next time this course is being offered to have the "I" grade change to a letter grade. All the assessment components and marks will be retained for the calculation of the final letter grade. The letter grade will be benchmarked against the same class for the semester in which the exam had been missed.
- Graded exam will be returned to you. Solutions will be discussed in class.

CALCULATOR POLICY

- Civil Engineering Department's policy: only calculators permitted by NCEES for use in the current semester's FE exam are permitted to be used in the examinations.
- No other make and model of calculator will be allowed.
- Models previously allowed by NCEES in the past but are no longer valid for the current FE exam are prohibited in the CE6306 exams. Please check <https://ncees.org/exams/calculator/> for the latest permitted calculator models.
- Models allowed by another professors in his/her exam is not an excuse. This is CE6306 and you should follow CE6306 course policy.
- If an unapproved calculator is found during any exam, it will be reported as "cheating – bringing unauthorized materials into the exam".

COURSE DROP POLICY

I will not drop you from the course. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the [Registrar's Office](#) to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

EXTRA CREDIT POLICY

I will not give extra credit to individual – this is considered a form of discrimination. If opportunity to earn extra credit arise, all students in the course will have equal opportunity.

ACCOMMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#) (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the [CASS portal](#).

COVID-19 ACCOMMODATIONS

Students are not permitted on campus when they have a positive COVID-19 test, exposure or symptoms. If you are not permitted on campus, you should contact me as soon as possible so we can arrange necessary and appropriate accommodations.

(classes with on-campus meetings) Students who are considered high risk according to CDC guidelines and/or those who live with individuals who are considered high risk may contact [Center for Accommodations and Support Services](#) (CASS) to discuss temporary accommodations for on-campus courses and activities.

SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

CLASS RECORDINGS

The use of recordings will enable you to have access to class lectures, if you miss a synchronous class meeting due to illness or other extenuating circumstance. Our use of such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP's acceptable-use policy. A recording of class sessions will be kept and stored by UTEP, in accordance with FERPA and UTEP policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course.** Doing so may result in disciplinary action.

COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated. Doing so may result in disciplinary action.

COVID-19 PRECAUTIONS

You must STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who has received a positive coronavirus test. Reports should be made at screening.utep.edu. If you know of anyone who should report any of these three criteria, you should encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to COVIDaction@utep.edu.

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website (screening.utep.edu) prior to arriving on campus. The website will verify if you are permitted to come to campus. Under no circumstances should anyone come to class when feeling ill or exhibiting any of the known COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection.

Wear face coverings when in common areas of campus or when others are present. You must wear a face covering over your nose and mouth at all times in this class. If you choose not to wear a face covering, you may not enter the classroom. If you remove your face covering, you will be asked to put it on or leave the classroom. Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 *Health and Safety* and Section 1.2.2.5 *Disruptions* in the UTEP Handbook of Operating Procedures.

(classes with on-campus meetings) Please note that if COVID-19 conditions deteriorate in the City of El Paso, all course and lab activities may be transitioned to remote delivery.